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LaTendresse et al.

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(54) **WEARPAD AND WEARPAD HOUSING ARRANGEMENT FOR A TELESCOPIC BOOM ASSEMBLY**

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(51) **Int. Cl.**

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B66F 9/065	(2006.01)
E02F 3/30	(2006.01)
E02F 3/28	(2006.01)

(52) **U.S. Cl.**

CPC ***B66C 23/707*** (2013.01); ***B66F 9/0655*** (2013.01); *E02F 3/286* (2013.01); *E02F 3/306* (2013.01)

(58) **Field of Classification Search**

CPC B66C 23/707; B66F 9/0655; E02F 3/286

See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

3,690,742	A *	9/1972	Sung	B66C 23/707 384/42
4,406,375	A *	9/1983	Hockensmith	B66C 23/707 212/348
5,158,189	A *	10/1992	Watson	B66C 23/707 212/350
5,829,606	A *	11/1998	Erdmann	B66C 23/707 212/350
5,865,328	A *	2/1999	Kaspar	B66C 23/701 212/230

(Continued)

Primary Examiner — Paola Agudelo

(74) *Attorney, Agent, or Firm* — Brinks Gilson & Lione

(57) **ABSTRACT**

In one aspect, the present disclosure provides a wearpad for a telescopic boom assembly including a first surface for contacting an outer boom of the boom assembly, a second surface for contacting an inner boom of the boom assembly, and a length, where the first surface and the second surface extend along the length, and where the length extends along a longitudinal direction. A chamfered portion of the wearpad may have a first end at a first location along the length and a second end at a second location along the length. The first surface and the second surface may converge along the chamfered portion. Thus, a first distance between the first surface and the second surface at the first end of the chamfered portion may be greater than a second distance between the first surface and the second surface at the second end of the chamfered portion.

10 Claims, 12 Drawing Sheets

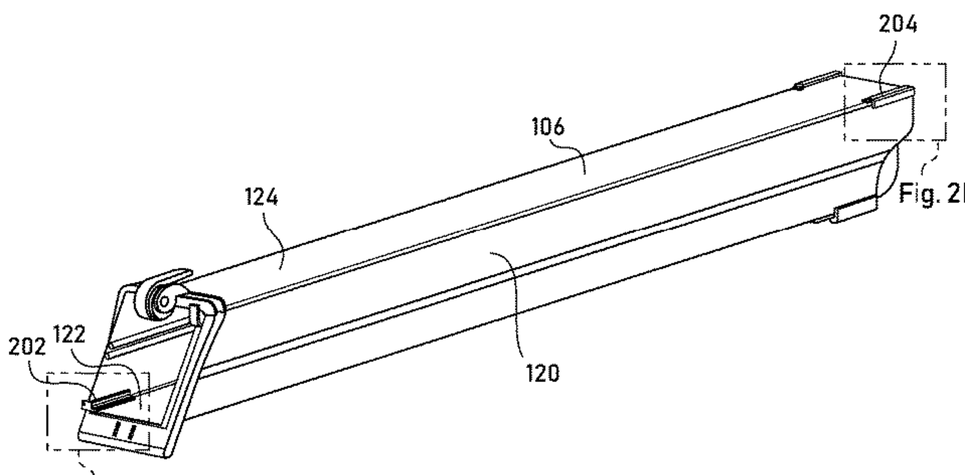
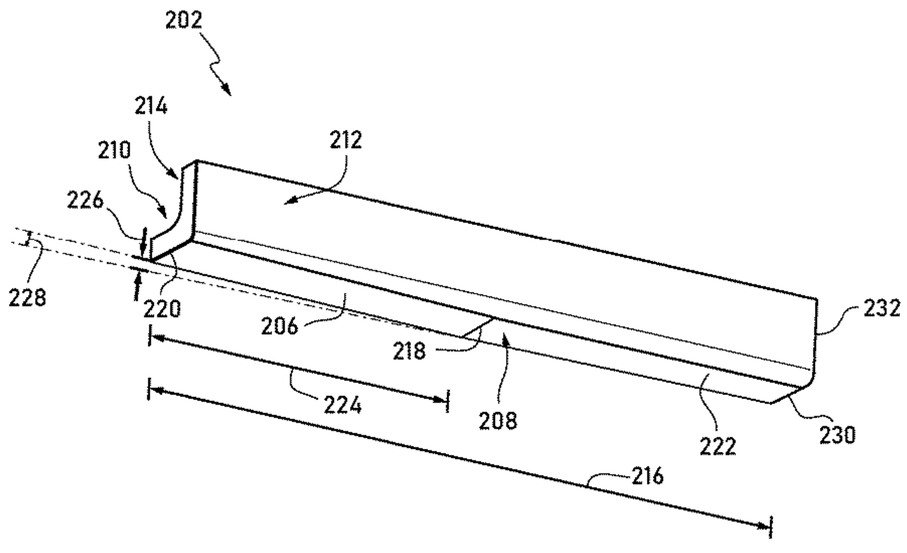


Fig. 2A

Fig. 2B



(56) **References Cited**

U.S. PATENT DOCUMENTS

6,062,404	A *	5/2000	Erdmann	B66C 23/707 212/292
6,499,612	B1 *	12/2002	Harrgington	B66C 23/701 212/270
7,293,377	B2	11/2007	Pinther, II et al.	
8,439,566	B2 *	5/2013	Connell	F16B 5/0225 384/40
8,678,210	B1 *	3/2014	Harrington	B66C 23/00 212/177
8,783,344	B2 *	7/2014	Aung	E21B 17/1085 166/241.1
8,801,354	B2 *	8/2014	Lettau	E02F 3/286 414/722
2006/0226107	A1 *	10/2006	Brinkmann	B66C 23/707 212/350
2016/0130119	A1 *	5/2016	Fortunato	B66C 23/707 384/29
2018/0251348	A1 *	9/2018	Calaman	B66C 23/707

* cited by examiner

Fig. 1

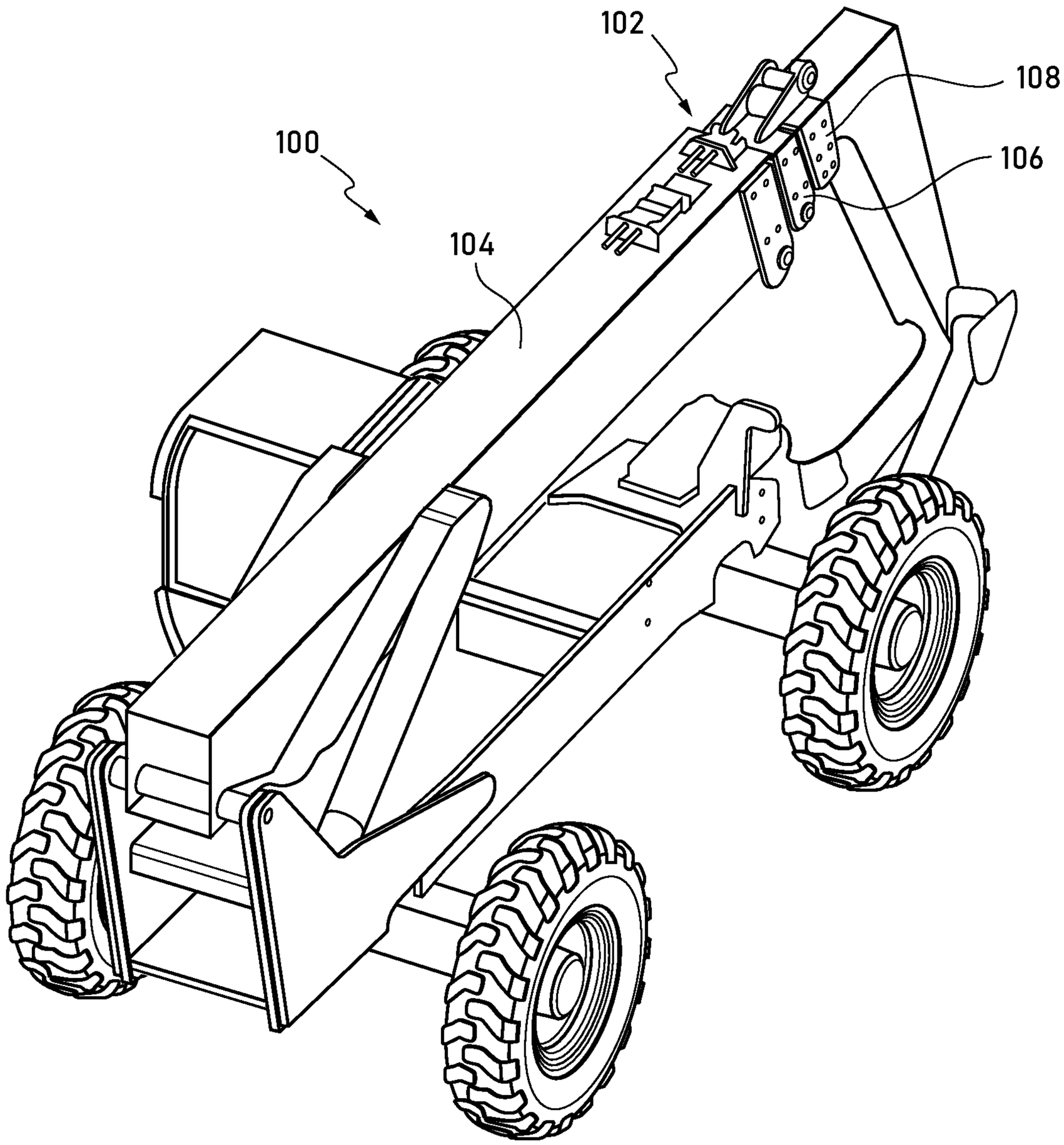


Fig. 2

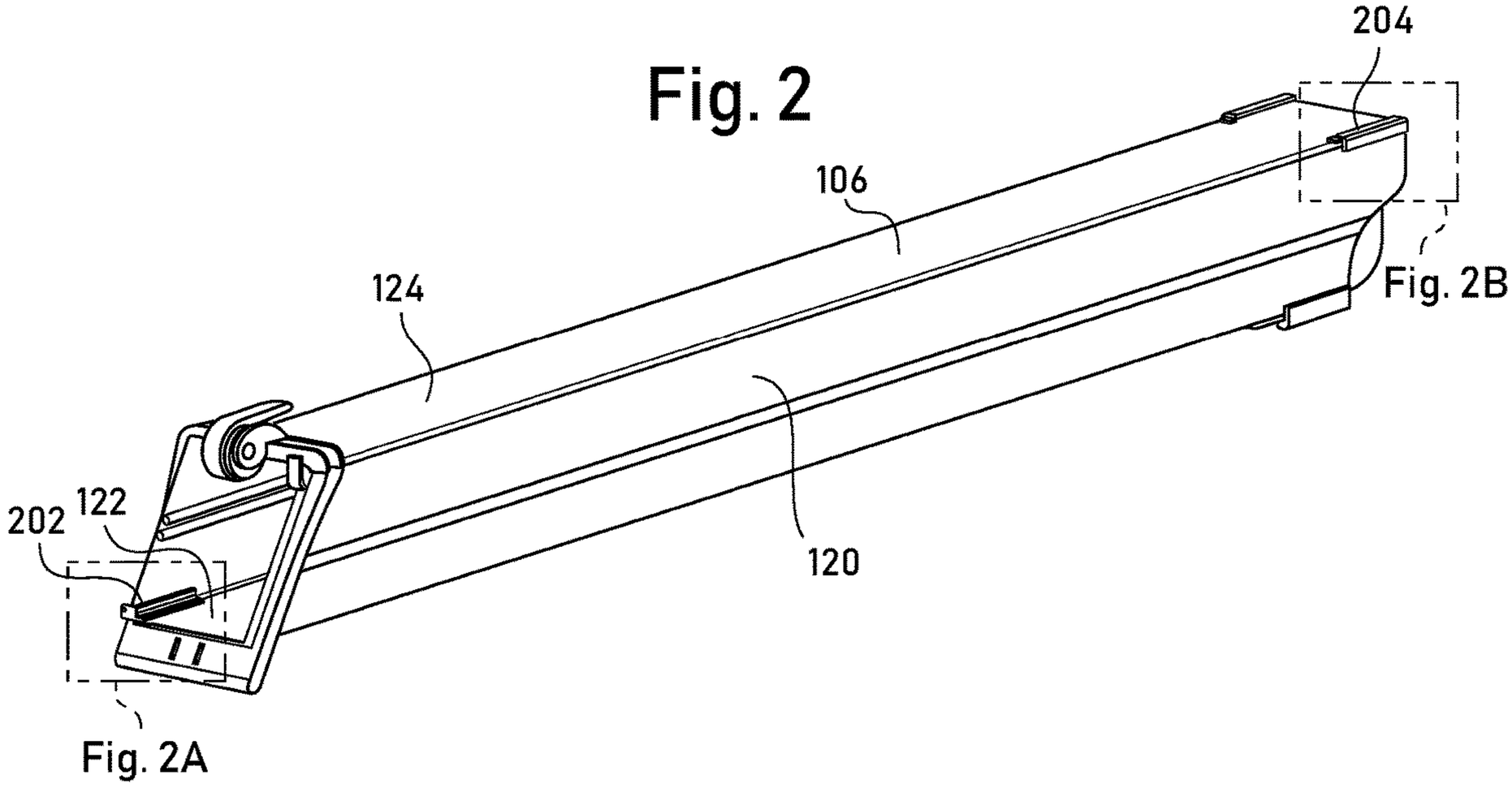


Fig. 2A

Fig. 2A

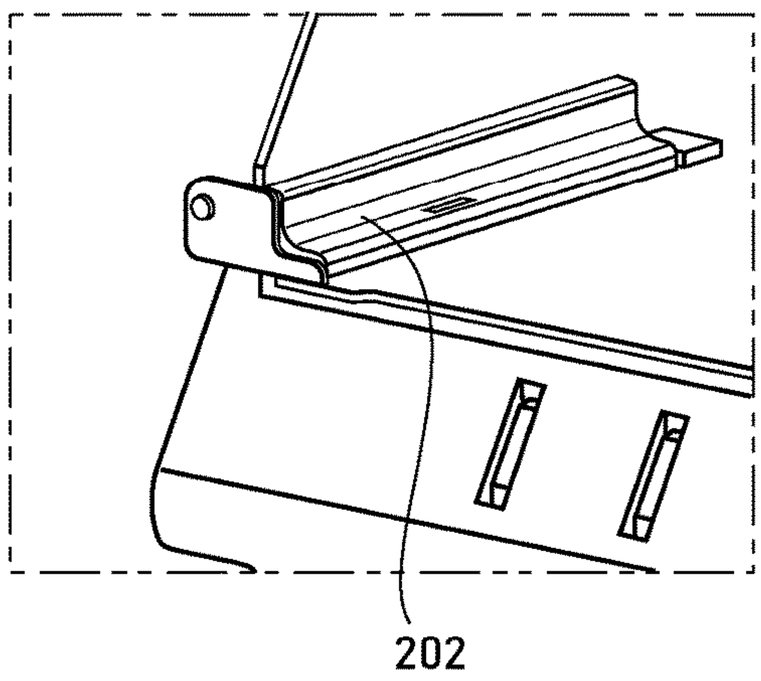


Fig. 2B

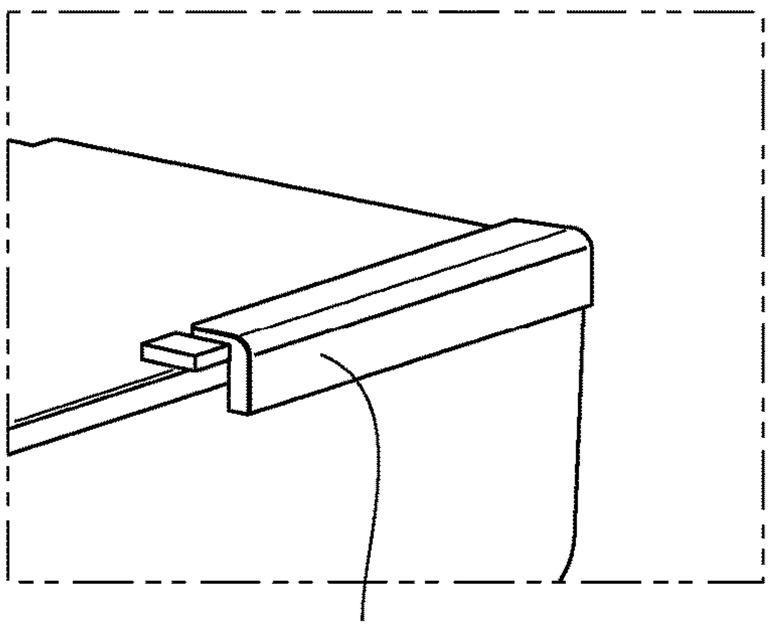


Fig. 3

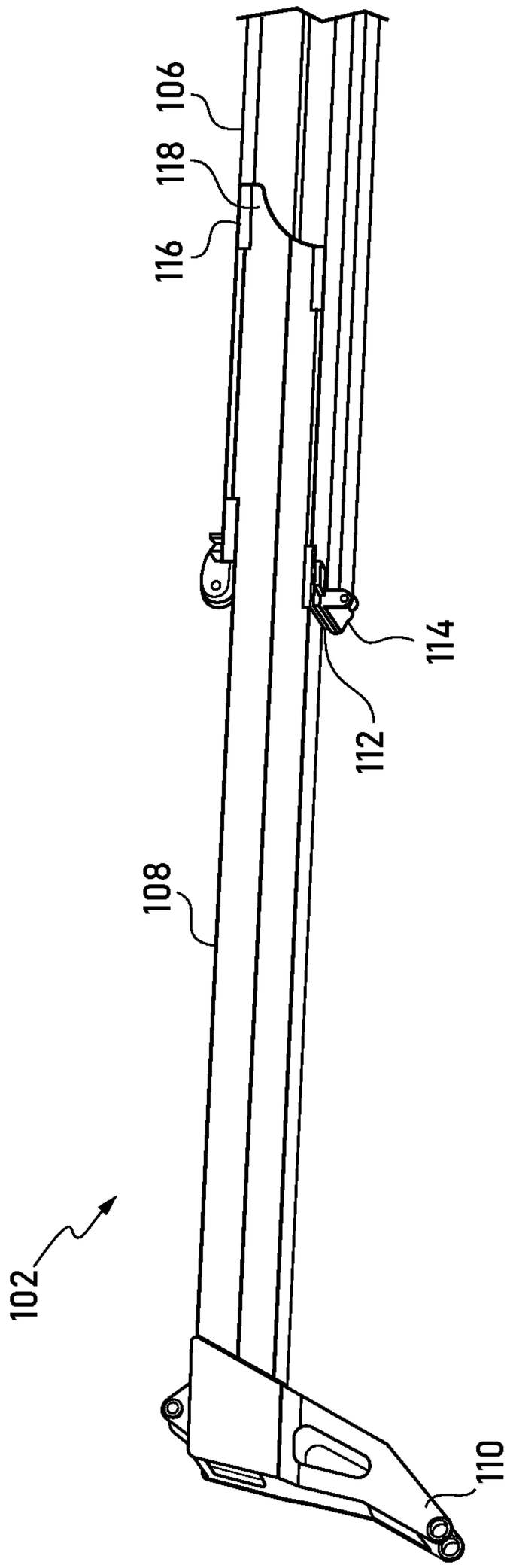


Fig. 4

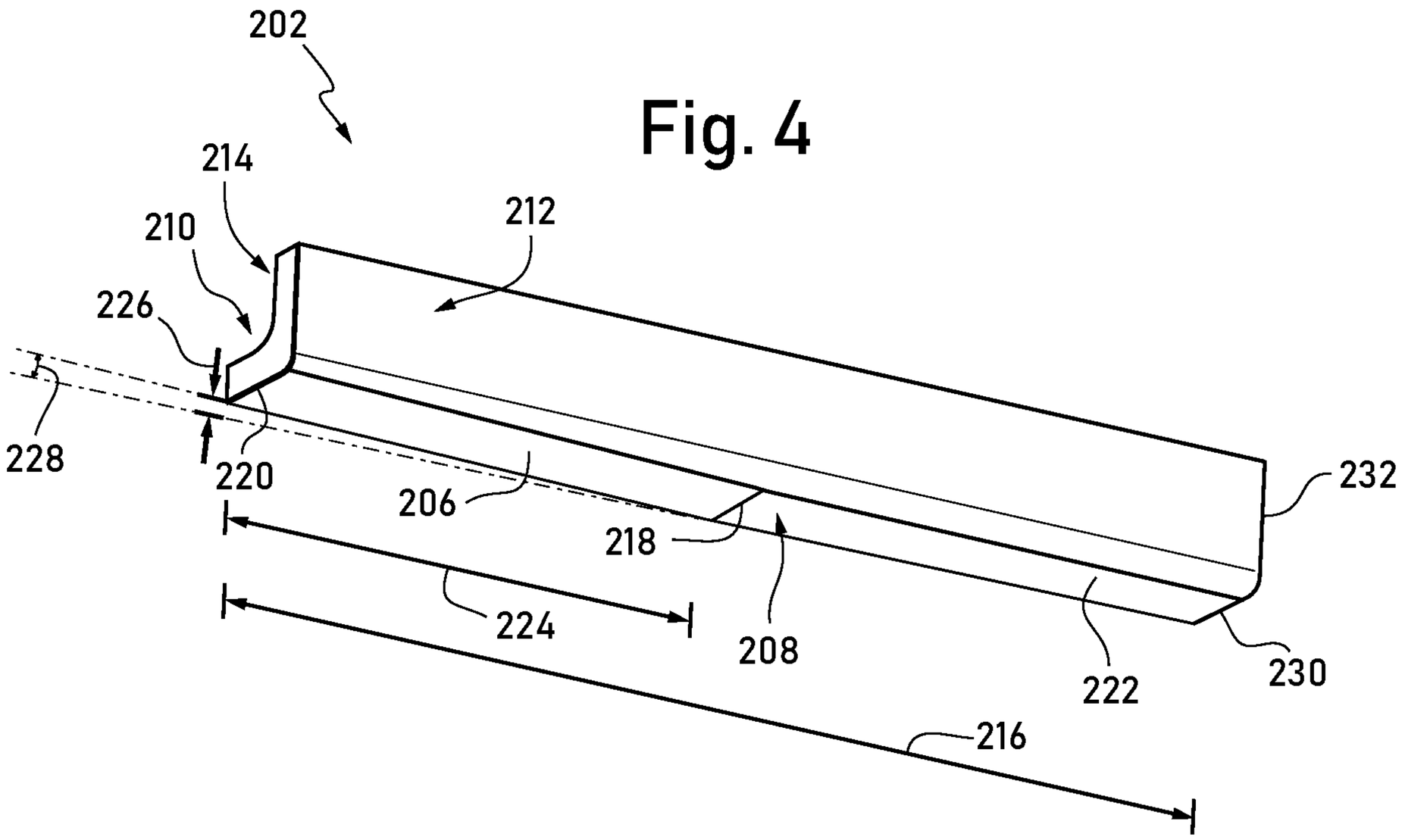


Fig. 5

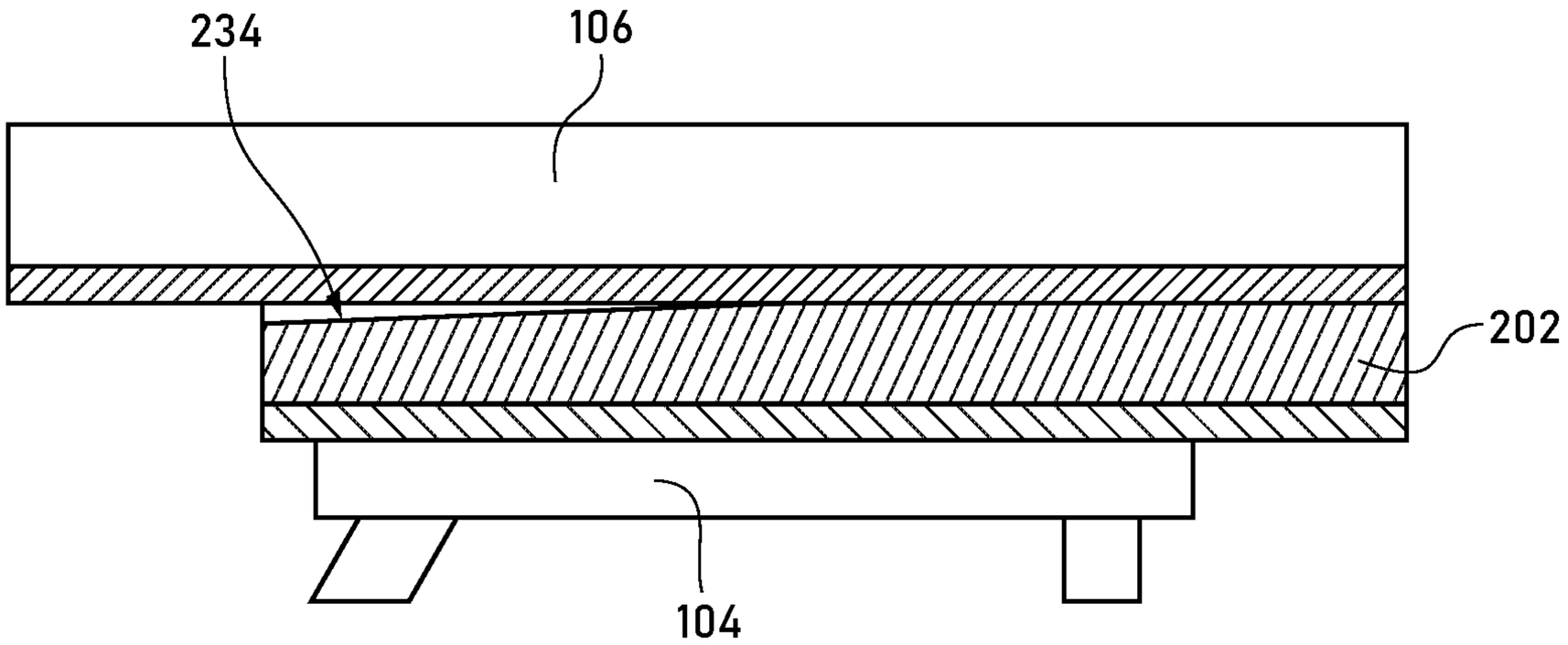


Fig. 6

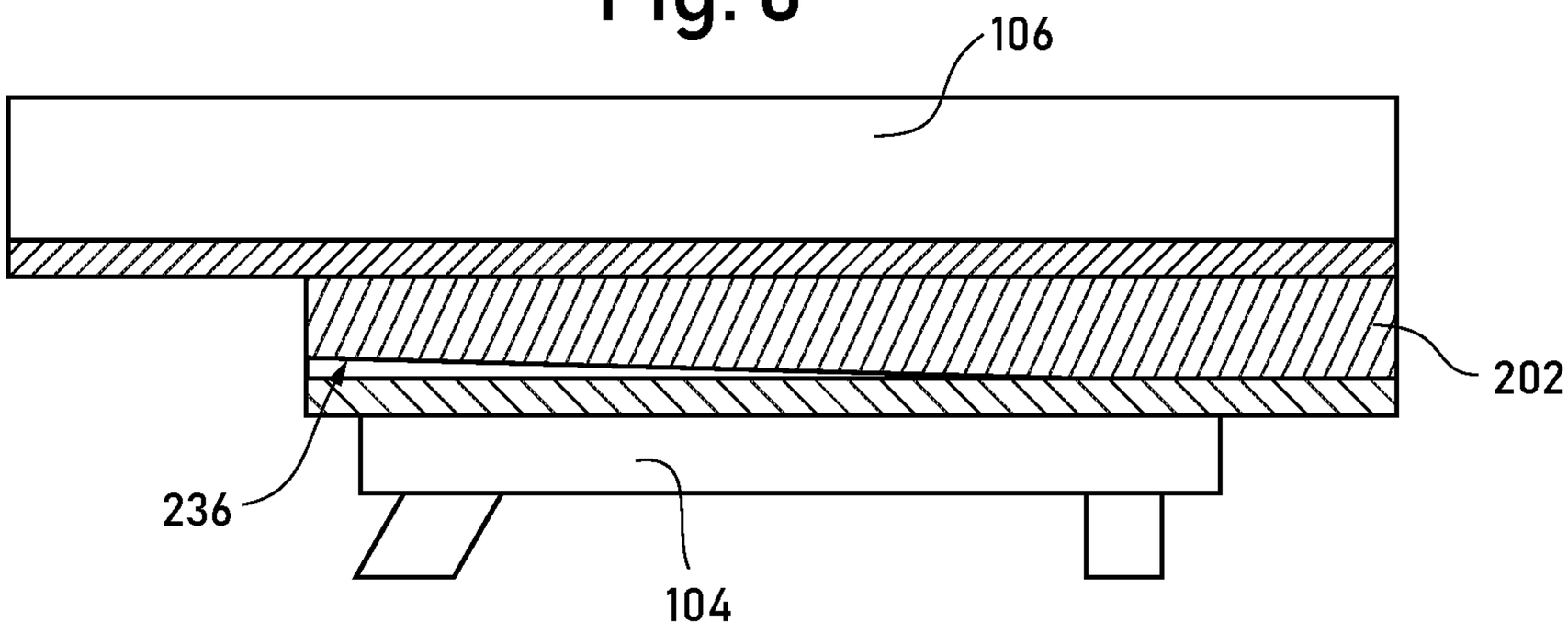


Fig. 7A

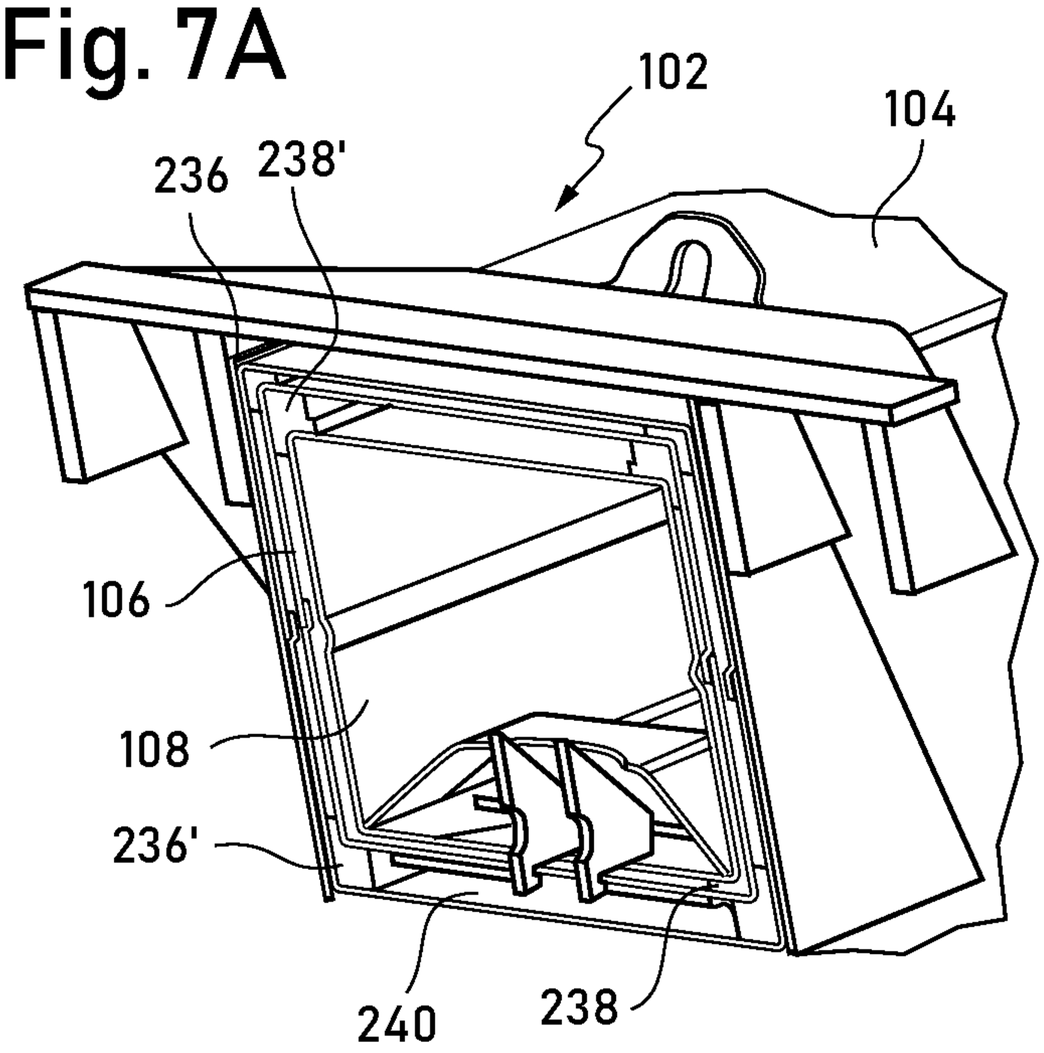

102
104
236
238'
106
108
236'
240
238

Fig. 7B

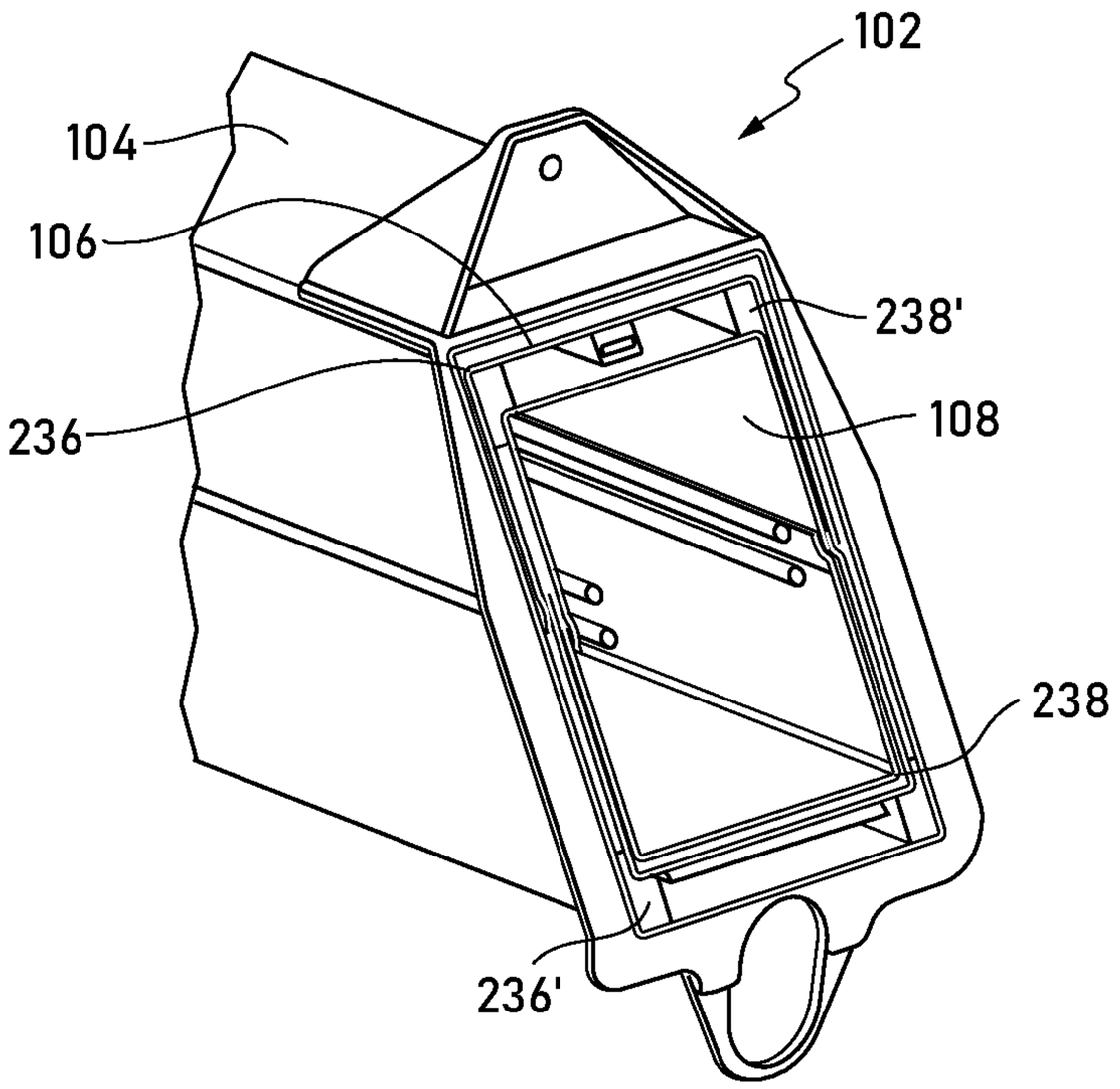

102
104
106
238'
236
108
238
236'

Fig. 8A

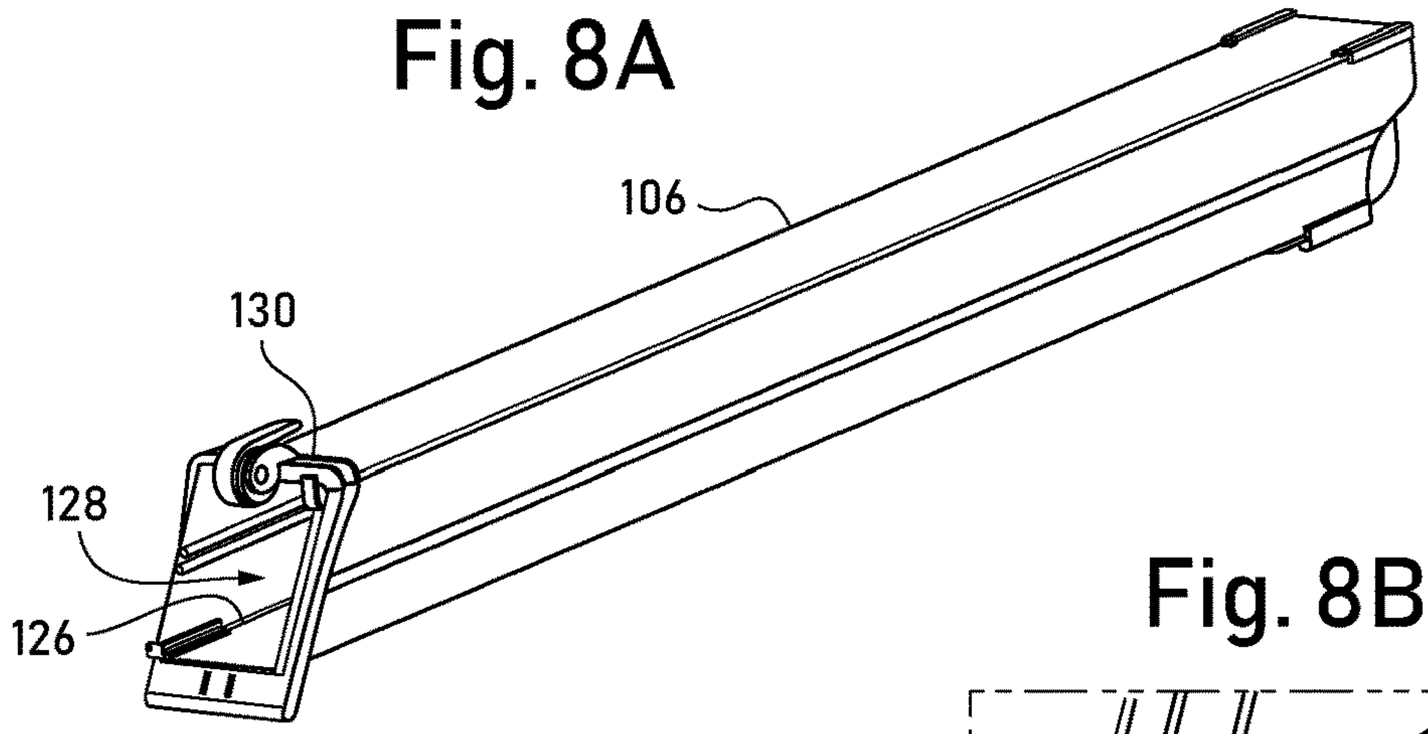


Fig. 8B

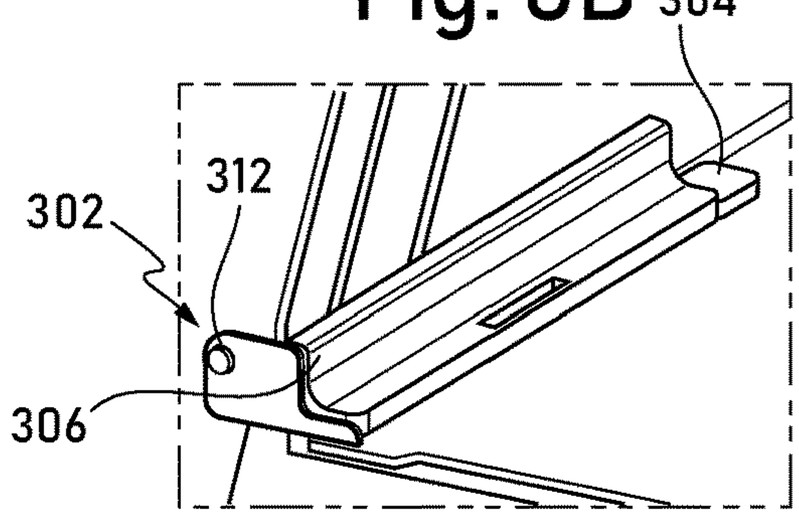


Fig. 8C

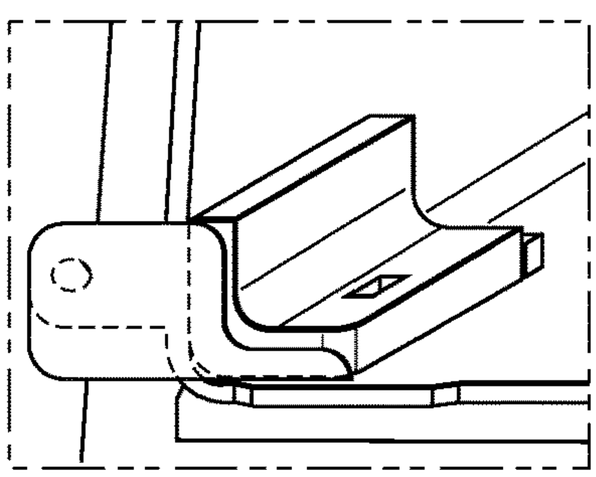


Fig. 8D

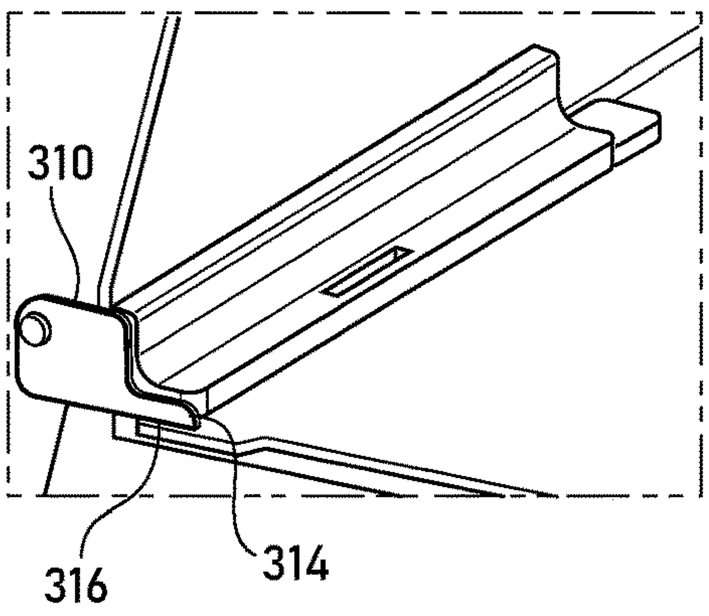


Fig. 8E

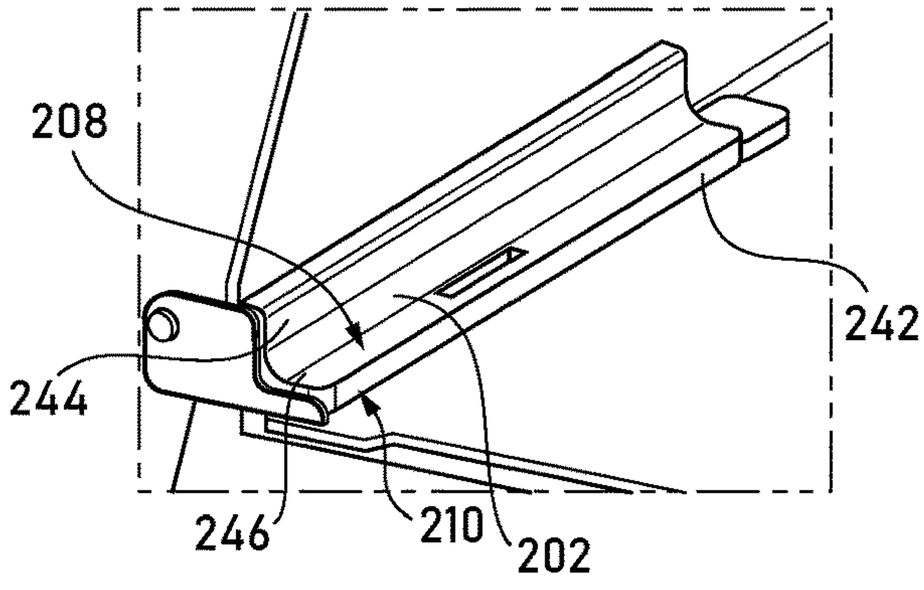


Fig. 9A

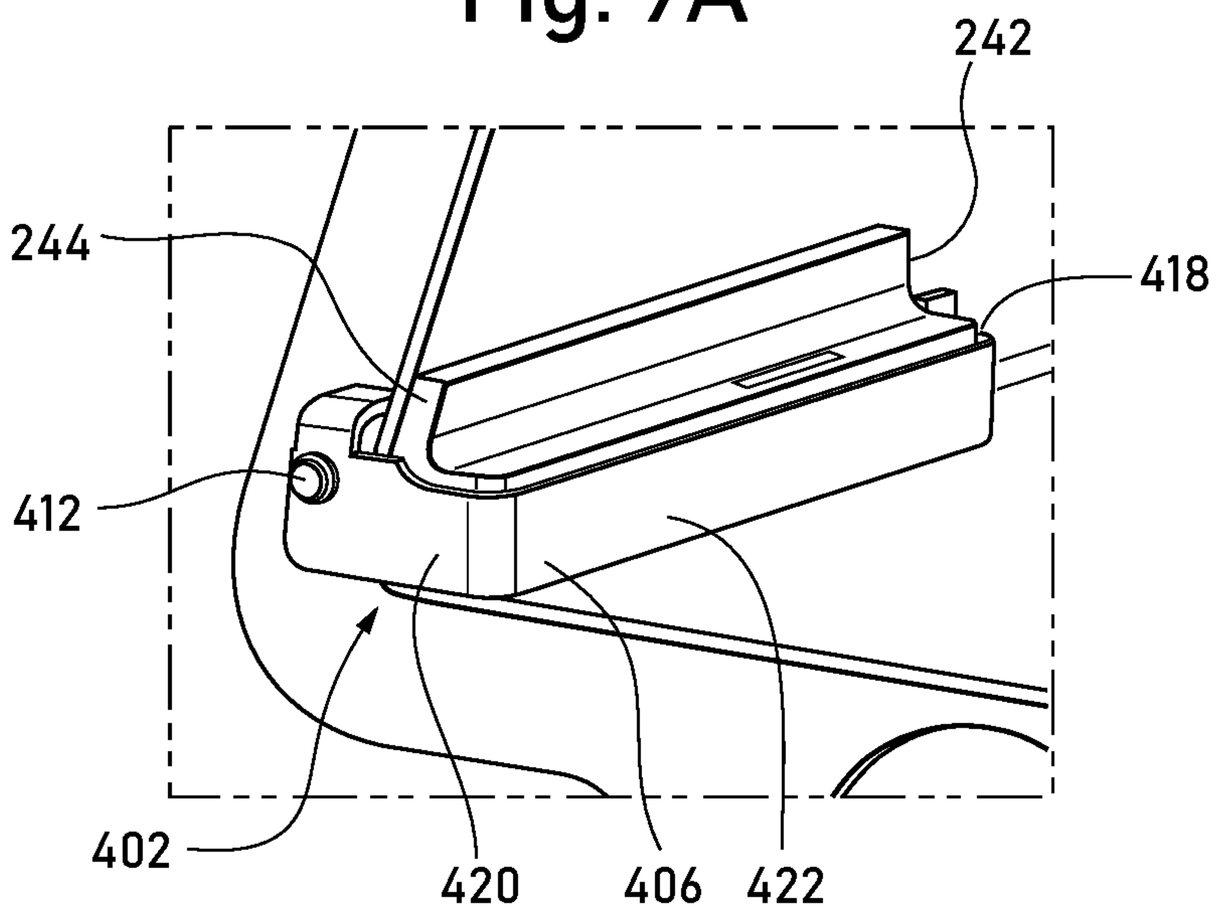


Fig. 9B

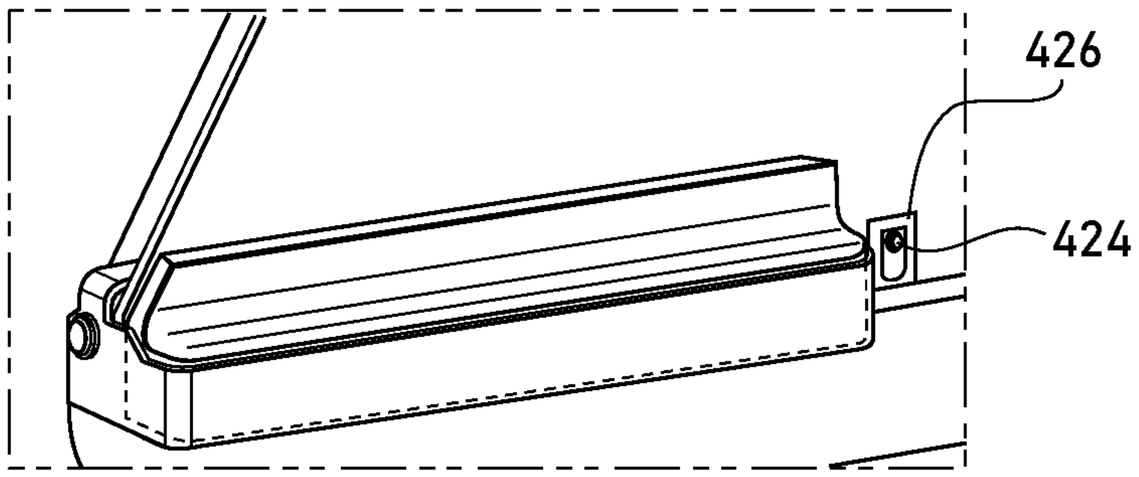


Fig. 10A

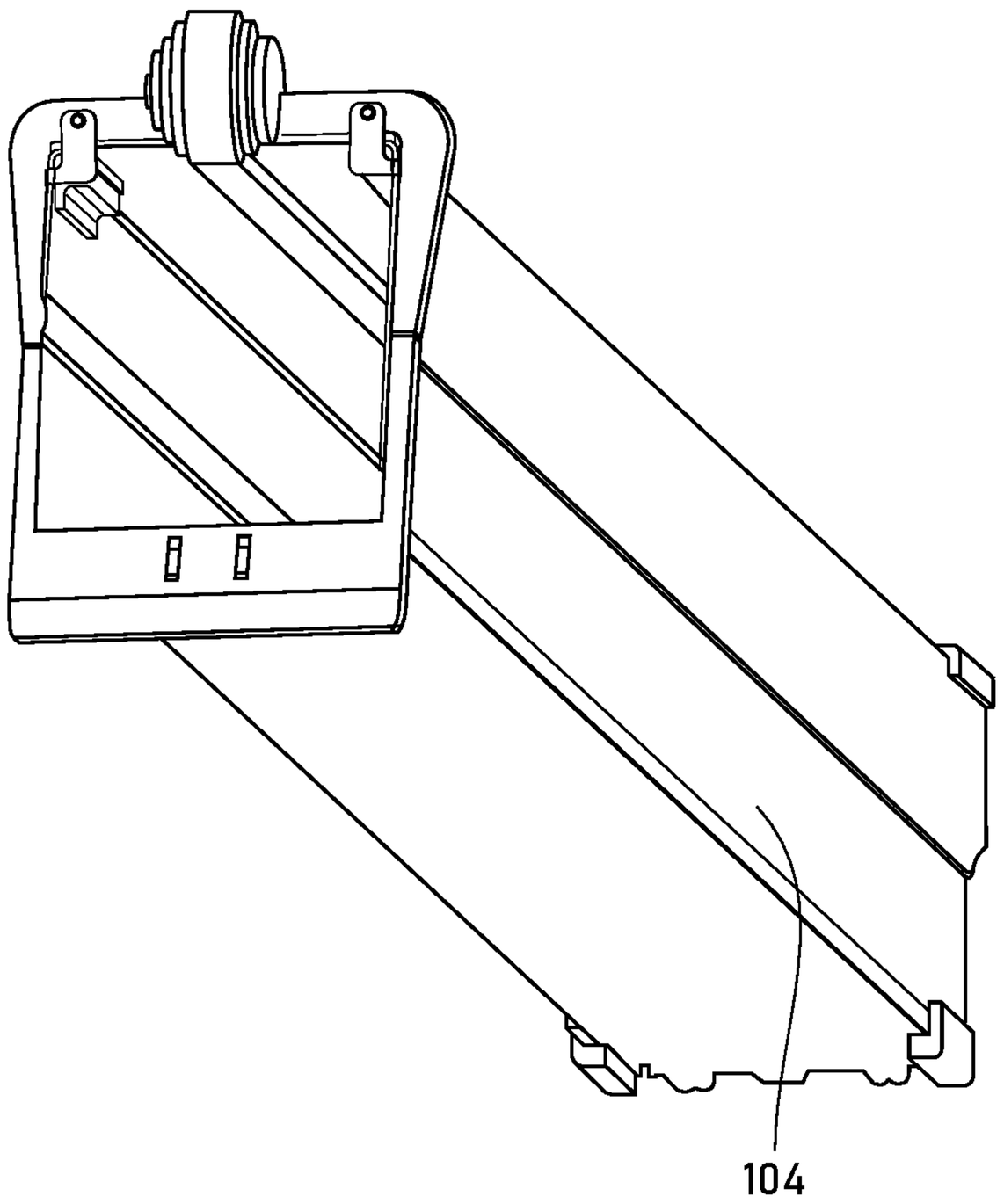


Fig. 10B

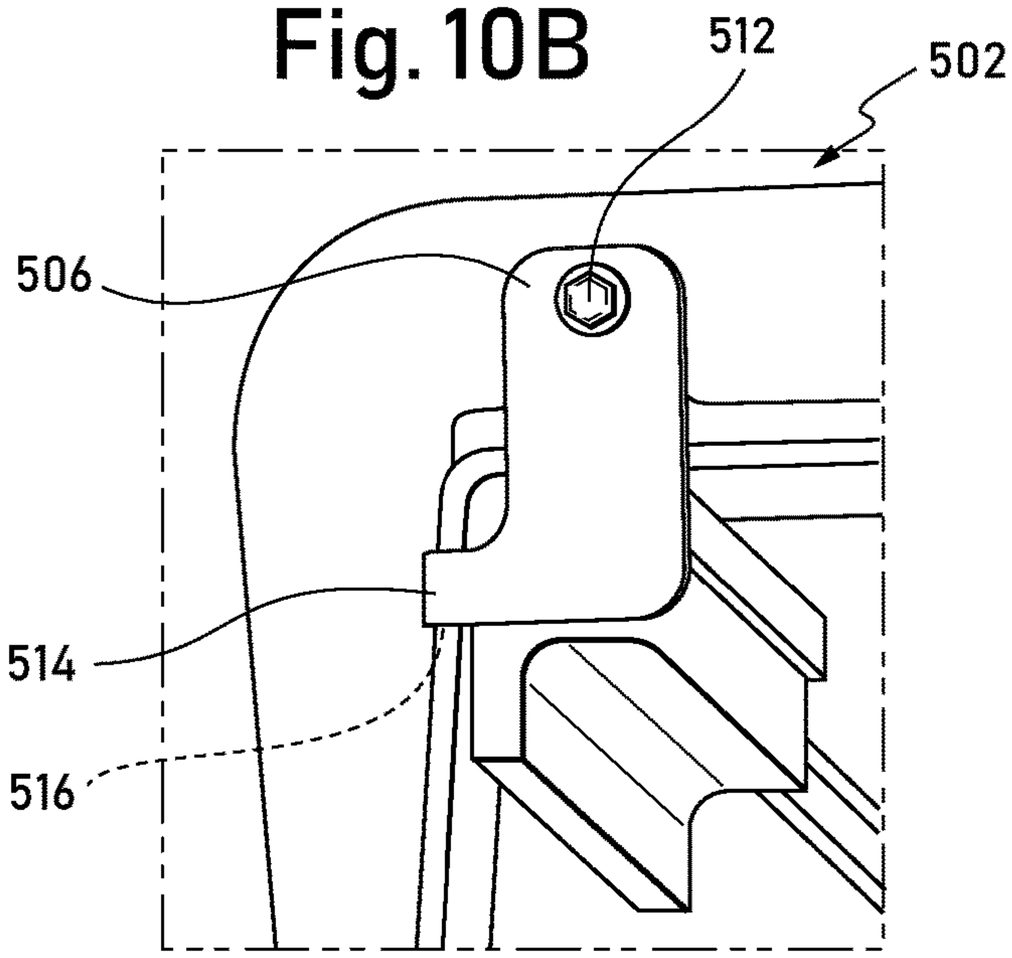


Fig. 10C

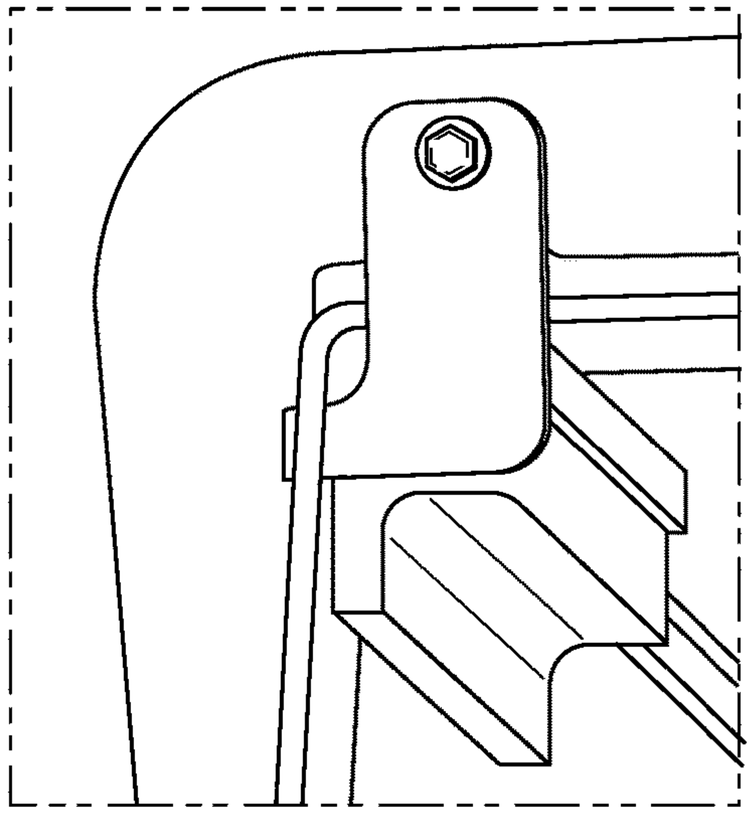


Fig. 10D

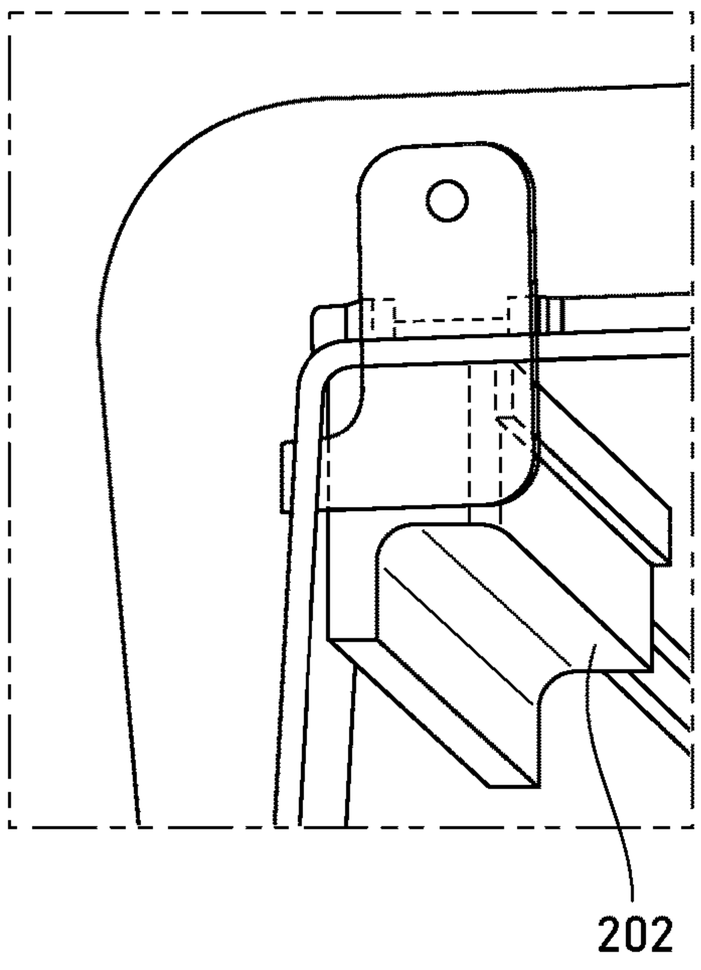


Fig. 10E

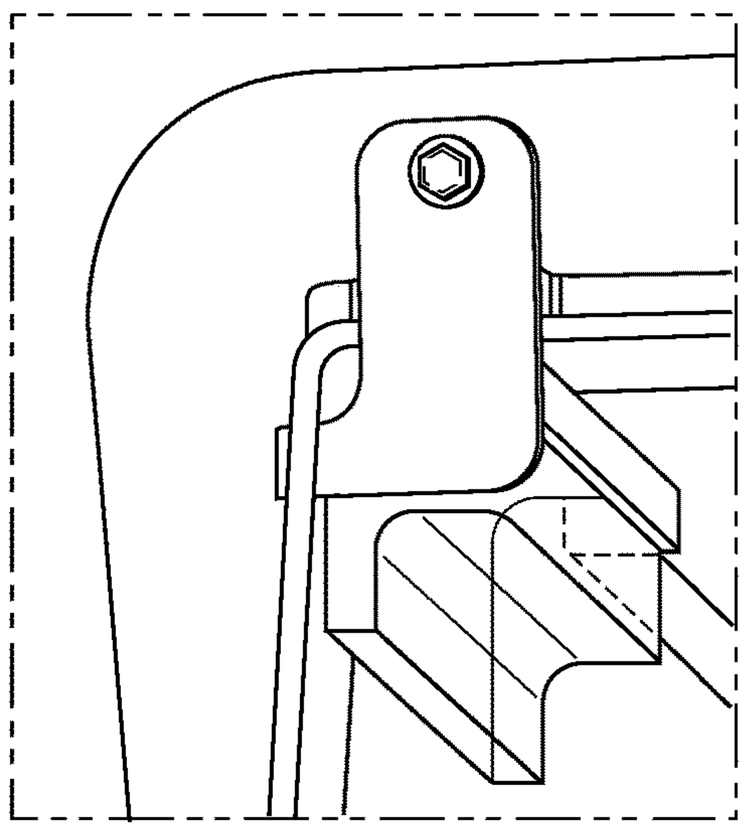


Fig. 11A

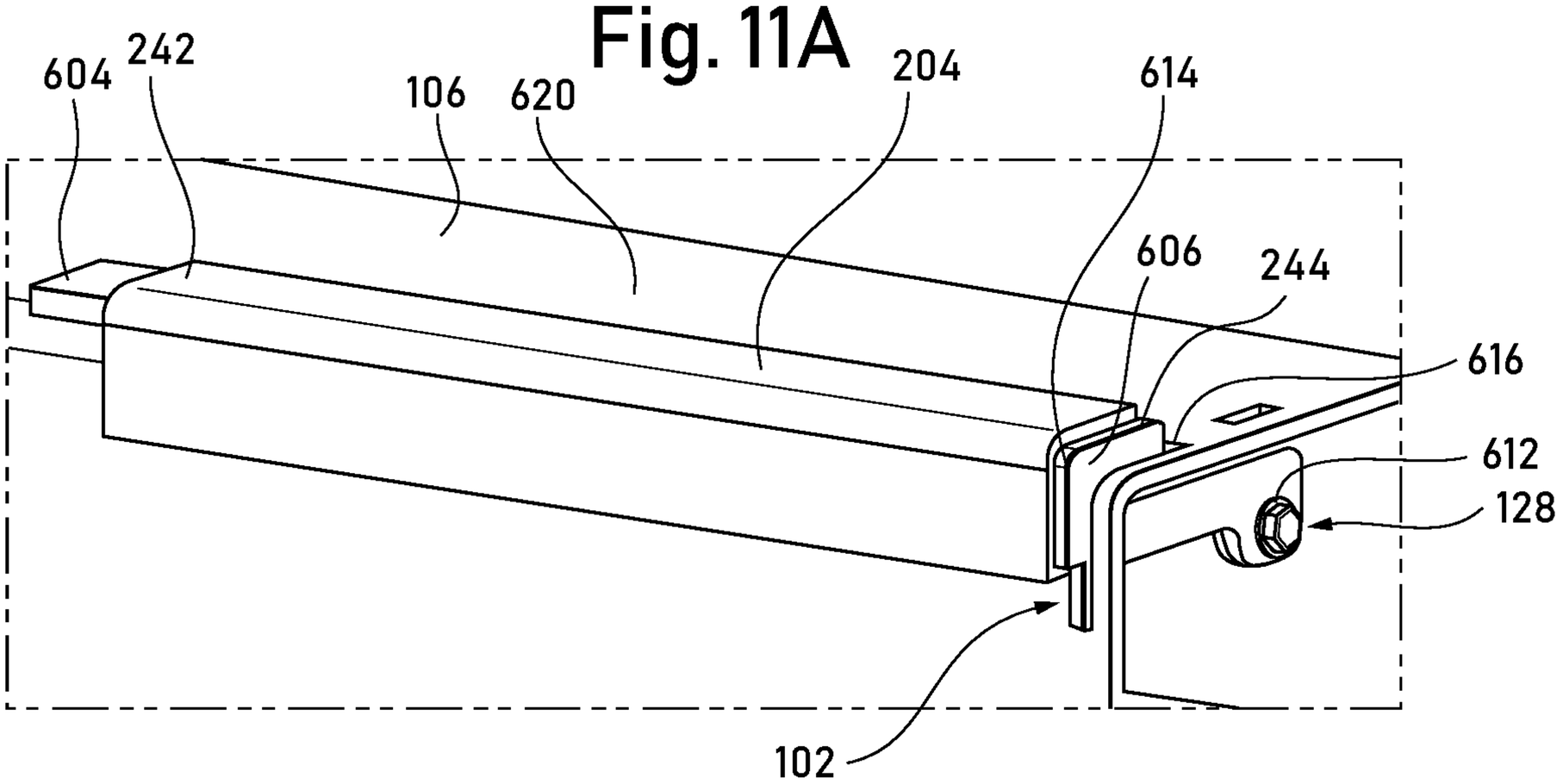


Fig. 11B

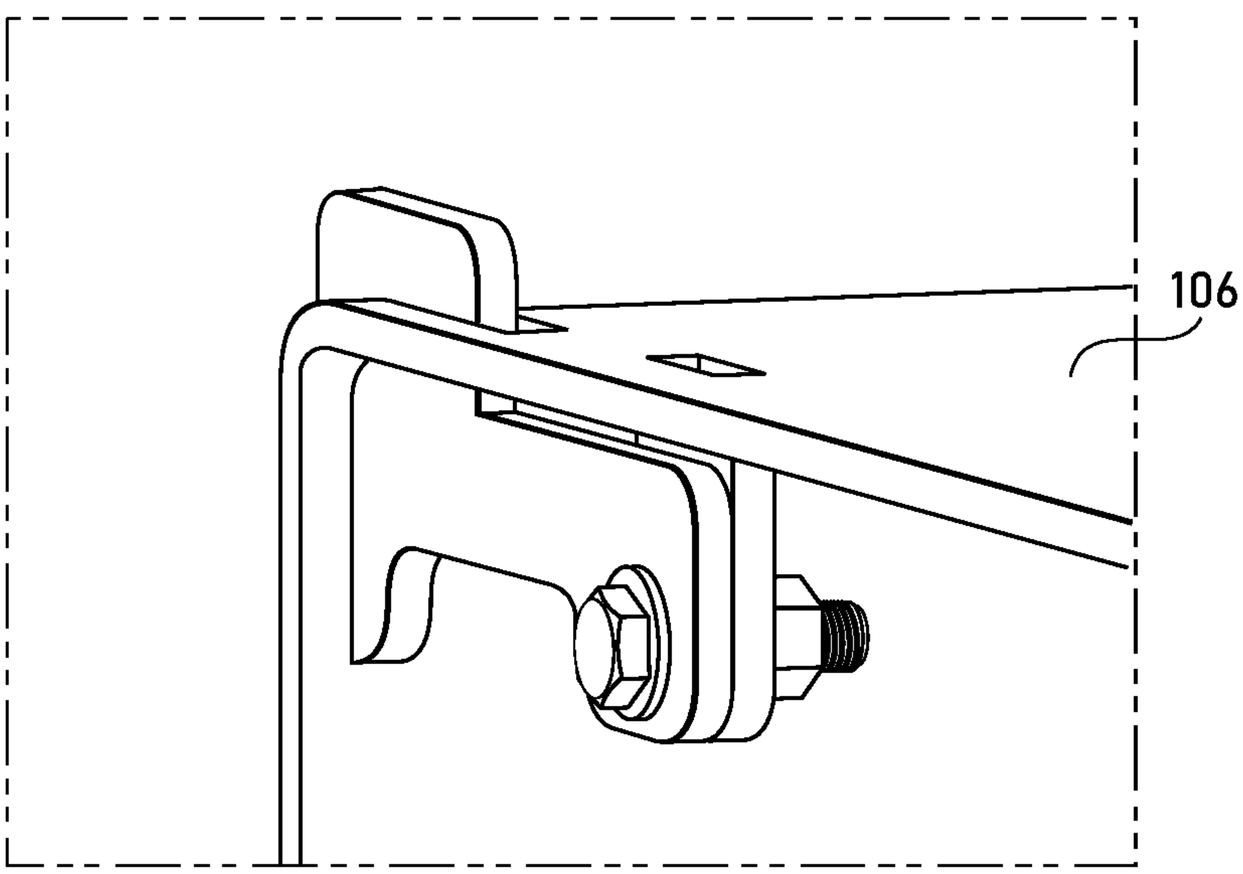


Fig. 11C

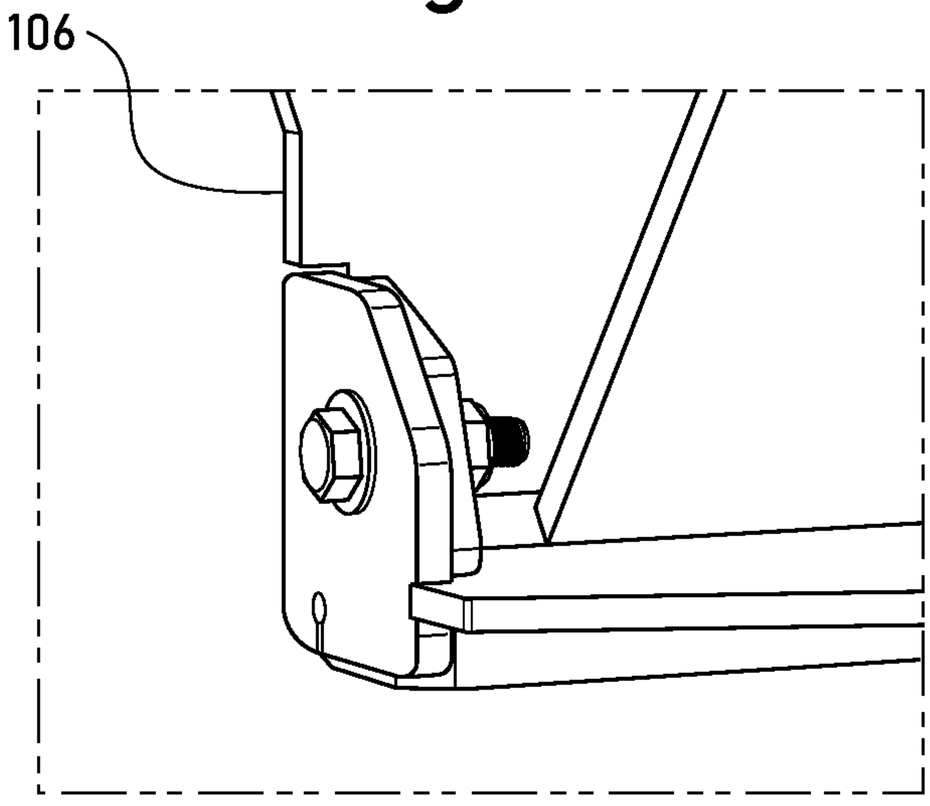
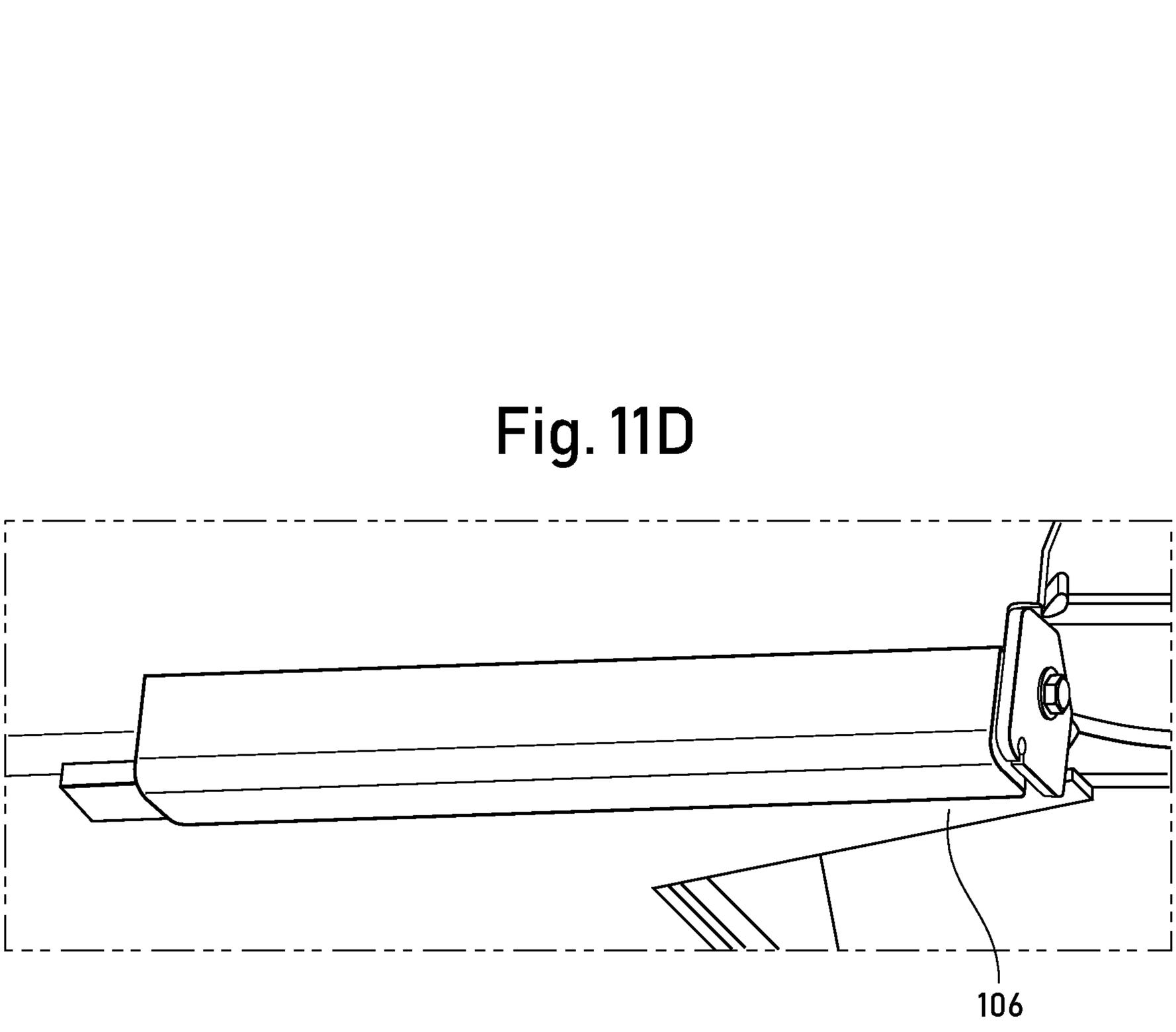


Fig. 11D



WEARPAD AND WEARPAD HOUSING ARRANGEMENT FOR A TELESCOPIC BOOM ASSEMBLY

RELATED APPLICATIONS

This application claims the benefit of U.S. Provisional Application No. 62/587,927, filed Nov. 17, 2017, which is hereby incorporated by reference in its entirety.

BACKGROUND

The present embodiments relate generally to a handling machine, such as an extendable forklift. Handling machines often include extendable, telescoping boom assemblies with forklift attachments or other attachments for reaching, lifting, moving, and otherwise handling pallets and/or other objects. When handling machines operate hydraulically, they typically include multiple hydraulic cylinders that can be controlled and actuated by a user within the passenger compartment of the handling machine to ultimately position the attachment, e.g., a fork frame, by extending or retracting the booms.

Since the booms are movable relative to one another, wearpads are often included between inner and outer booms. Wearpads may provide a suitable friction between the respective booms to protect the booms from wear and damage. The wearpads are typically designed to be low-cost and replaceable such that they can be periodically replaced, thus increasing the lifespan of the other components (such as the booms themselves). While using replaceable wearpads has been successful in the past, current wearpads have been found to focus forces and stress in certain locations when the boom assembly experiences a heavy load, which may diminish the lifespan of the wearpad and potentially cause wear or damage to the booms. Further, replacing current wearpads has been found to be difficult, particularly when specialized tools are not available and/or multiple operators are not present.

In view of this background, it would be advantageous to provide an improved wearpad that provides an improved distribution of stress, and also an improved wearpad housing arrangement to simplify wearpad replacement.

BRIEF SUMMARY

In one aspect, the present disclosure provides a wearpad for a telescopic boom assembly. The wearpad may include a first surface for contacting an outer boom of the boom assembly, a second surface for contacting an inner boom of the boom assembly, and a length, where the first surface and the second surface extend along the length, and where the length extends along a longitudinal direction of a boom assembly. The wearpad may further include a chamfered portion with a first end at a first location along the length and a second end at a second location along the length. The first surface and the second surface may converge along the chamfered portion. Thus, a first distance between the first surface and the second surface at the first end of the chamfered portion may be greater than a second distance between the first surface and the second surface at the second end of the chamfered portion.

In another aspect of the present disclosure, a wearpad for a telescopic boom assembly may include a first surface for contacting an outer boom of the boom assembly and a second surface for contacting an inner boom of the boom assembly. The wearpad may further include a third surface for contacting the outer boom of the boom assembly and a fourth surface for contacting the inner boom of the boom assembly. The first surface may be perpendicular to the third surface, and the second surface may be perpendicular to the fourth surface.

In another aspect, the present disclosure provides a housing arrangement for a wearpad. The housing arrangement may include a boom for a telescopic boom assembly and a plate for contacting at least one end of the wearpad when the wearpad is installed adjacent to the boom. A fastener may be included for securing the plate to a surface of a boom. At least one of the plate and the boom may include a tab, and the other of the plate and the boom may include a slot, where the slot is configured to constrain the tab in at least two directions when the slot receives the tab.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is an illustration showing a perspective view of an example of a handling machine with a telescopic boom assembly in accordance with certain embodiments of the present disclosure.

FIG. **2** is an illustration showing a perspective view of a boom for a telescopic boom assembly with inner and outer wearpads in accordance with certain embodiments of the present disclosure.

FIGS. **2**A-**2**B are illustrations showing magnified views of the respective inner and outer wearpads depicted in FIG. **2**.

FIG. **3** is an illustration showing a side view of a portion of a boom assembly in an extended state.

FIG. **4** is a perspective view showing an L-shaped wearpad in accordance with certain embodiments of the present disclosure.

FIG. **5** is an illustration showing a side view of an outer boom, an inner boom, and a wearpad located therebetween, where the wearpad includes an angled top surface in accordance with certain embodiments of the present disclosure.

FIG. **6** is an illustration showing a side view of an outer boom, an inner boom, and a wearpad located therebetween, where the wearpad includes an angled bottom surface in accordance with certain embodiments of the present disclosure.

FIGS. **7**A-**7**B are illustrations showing perspective views of a rear section and a front section of a boom assembly with L-shaped wearpads in accordance with certain embodiments of the present disclosure.

FIGS. **8**A-E are illustrations showing various views of a housing arrangement for a wearpad in accordance with certain embodiments of the present disclosure.

FIGS. **9**A-B are illustrations showing various views of another embodiment of a housing arrangement for a wearpad in accordance with certain embodiments of the present disclosure.

FIGS. **10**A-E are illustrations showing various views of another embodiment of a housing arrangement for a wearpad in accordance with certain embodiments of the present disclosure.

FIGS. **11**A-D are illustrations showing various views of another embodiment of a housing arrangement for a wearpad in accordance with certain embodiments of the present disclosure.

DETAILED DESCRIPTION

The present embodiments are described with reference to the drawings in which like elements are referred to by like

numerals. The relationship and functioning of the various elements of this invention are better understood from the following detailed description. However, the embodiments of the invention are not limited to the embodiments illustrated in the drawings. It should be understood that in certain instances, details have been omitted which are not necessary for an understanding of the present invention, such as conventional fabrication and assembly.

FIG. **1** is an illustration showing a perspective view of a handling machine **100** with a telescopic boom assembly **102**. While the present disclosure may be applicable to any suitable handling machine with a telescopic boom assembly, one example is a Extendo Series Telehandler sold by Pettibone® of Baraga, Mich. As shown, the telescopic boom assembly **102** may include a plurality of booms that can extend in a telescoping manner such that the total length of the boom assembly **102** is adjustable. As shown, the boom assembly **102** may include a first boom **104**, a second boom **106**, and a third boom **108**, but it is also contemplated that fewer or more than three booms may be included. For purposes of this disclosure, an "inner boom" is at least partially encompassed by an "outer boom" in a default or non-extended state, and then extends from an opening of the "outer boom" when in a telescopic or extended state. Thus, the first boom **104** is an "outer boom" with respect to the second boom **106** and the third boom **108**, the second boom **106** is an "inner boom" with respect to the first boom **104** and an outer boom with respect to the third boom **108**, and the third boom **108** is an "inner boom" with respect to the first boom **104** and the second boom **106**.

FIG. **2** is an illustration showing a perspective view of the second boom **106** for the telescopic boom assembly **102** (of FIG. **1**), where a set of inner wearpads **202** are located in the opening of the second boom **106** and a set of outer wearpads **204** are located on an outer perimeter of the second boom **106**. When incorporated into the boom assembly **102** (FIG. **1**), the wearpads **202** may be located between the second boom **106** and the third boom **108**, and the wearpads **204** may be located between the first boom **104** (FIG. **1**) and the second boom **106**. Among other functions, the wearpads **202**, **204** may prevent direct contact between respective booms, reduce friction as the respective booms move relative to each other, create space between respective booms for other components (e.g., wires, pneumatic components, etc.), and may be relatively low in cost and replaceable to protect higher-cost components (such as the booms themselves). While any suitable material is contemplated, in certain non-limiting exemplary embodiments, the wearpads **202**, **204** may be made from nylon (e.g., a cast nylon with or without reinforcement) that has a very low compressibility (i.e., deforms very little under a compression load) and a very high compression strength and a high bushing PV value. While not shown in FIG. **2**, the first boom **104** and/or the third boom **108** shown in FIG. **1** may also be secured to similar wearpads. FIGS. **2**A-**2**B are magnified views of a wearpad **202** and a wearpad **204**, respectively.

FIG. **3** is an illustration showing a side view of a portion of the boom assembly **102**, where the third boom **108** is in an extended state with respect to the second boom **106**. Typically, when a flat wearpad is used between the third boom **108** and the second boom **106**, and when a vertical load is applied to an end **110** of the extended boom (such as when the end **110** of the third boom **108** lifts an object), the highest stresses at the junction of third boom **108** and the second boom **106** may be highly focused on a first location **112** adjacent to the bottom side of the boom assembly **102** at an end **114** of the second boom **106**, and also (to a lesser extend) at a second location **116** on a top side of the boom assembly **102** at an end **118** of the third boom **108**.

To distribute the above-described stresses, the wearpad **202** used between the respective booms may include a chamfered portion **206** as depicted in FIG. **4**, which is an illustration showing a perspective view of the wearpad **202** (also depicted in FIG. **2**). Each of the features with respect to the wearpad **202** of FIG. **4** described below (and particularly the L-shaped profile and presence of a chamfered portion) may also apply to other wearpads (e.g., wearpads **204** of FIG. **2**).

As shown in FIG. **4**, the wearpad **202** may include a first surface **208** for contacting an outer boom and a second surface **210** for contacting an inner boom of the boom assembly **102**. The first surface **208** and the second surface **210** may extend along a length **216** of the wearpad **202**, where the length **216** is parallel to, and extends along, a longitudinal direction of a boom assembly **102** when the wearpad **202** is installed. In some embodiments, a chamfered portion **206** of the wearpad **202** may have a first end **218** at a first location along the length **216** and a second end **220** at a second location along the length **216**, and the first surface **208** and second surface **210** may converge from the first end **218** to the second end **220**. In other words, the first surface **208** and the second surface **210** may be farther apart at the first end **218** than they are at the second end **220**. When installed on a boom of the boom assembly **102** (for example, as shown in FIG. **2**), the second end **220** of the chamfered portion **206** may be closer to the adjacent end of the respective boom, and the first end **218** may be closer to the middle and opposite (farther) end of the boom.

In some embodiments, the wearpad **202** may include a second portion **222** adjacent to the chamfered portion **206**. The first surface **208** and the second surface **210** may be parallel in the second portion **222**. Advantageously, the second portion **222** may provide the wearpad **202** with a suitable length to ensure proper spacing between the respective booms along with suitable strength, durability, and longevity of the wearpad **202**. The second portion **222** and the chamfered portion **206** may be positioned such that the chamfered portion **206** is closer to an adjacent end of the respective boom when installed (as shown in FIG. **2**). Thus, the first end **218** of the chamfered portion **206** may define the terminus of the second portion **222**.

Referring to the chamfered portion **206**, a distance **224** (i.e., parallel to the length **216**) from the first end **218** of the chamfered portion **206** to the second end **220** of the chamfered portion **206** may be substantially greater than the chamfer displacement **226**. Herein, the "chamfer displacement" is the amount that the respective surfaces (in this case the first surface **208** and the second surface **210**) converge from the first end **218** of the chamfered portion **206** to the second end **220** of the chamfered portion **206**. That is, the "chamfer displacement" is the difference between the distance between the first and second surfaces **208**, **210** at the first end **218** and the distance between the first and second surfaces **208**, **210** at the second end **220**. In some embodiments, the distance **224** is at least about 10 times as large as the chamfer displacement **226**, and it may be even substantially larger than that (e.g., at least 25 times as large, at least 50 times as large, at least 75 times as large, at least one hundred 100 times as large, at least one-hundred and fifty 150 times as large, at least two hundred 200 times as large, or even larger). In certain non-limiting exemplary embodiments, the distance **224** is at least about 2 inches, such as at least about 3 inches (and such as about 6 inches in one exemplary embodiment). Another potential way to define

the shape and size of the chamfered portion **206** is a chamfer angle **228**. The chamfer angle **228**, which is dependent on the distance **224** and the chamfer displacement **226**, may be less than about 5 degrees, such as less than about 2 degrees, and more particularly less than about 1 degree.

For example, in one embodiment analyzed by the inventors (e.g., through finite element analysis), the distance **224** was about 6 inches in length, and the chamfer displacement **226** was about 0.060 inches in length (such that the distance **224** was about one hundred (100) times as large as the chamfer displacement **226**, and such that the chamfer angle **228** was about 0.057 degrees). When a load was placed on an outer boom, the maximum stress at a single point of the about 40 ksi (i.e., kilopound per square inch). This embodiment reduced (by 67.5%) the maximum stress at a single location from a baseline of about 123 ksi, where the baseline involved the same load but used a wearpad without a chamfered portion (but otherwise having the same shape and dimensions). Advantageously, this reduction in point stress may substantially increase the longevity and durability of the wearpad **202** and also the associated booms, thus reducing downtime due to maintenance due to component fatigue, mechanical failure, etc.

Further, instead of including flat wearpads at a centralized location between corners of the boom (which is typical in the industry), the wearpad **202** may have an L-shaped cross-section with a base portion **230** and a perpendicular side portion **232** such that it is configured (sized and shaped) to surround a corner of the boom assembly **102**. In other words, the wearpad **202** may further include a third surface **212** for contacting the outer boom and a fourth surface **214** for contacting the inner boom. The first surface **208** may be perpendicular to the third surface **212**, and the second surface **210** may be perpendicular to the fourth surface **214**. Thus, the wearpad **202** may be associated with a corner of the boom assembly **102**, and four wearpads **202** may be used to space the respective booms (as shown in FIG. **2**). Still referring to FIG. **2**, the wearpads **202**, **204** on the left and right side of the boom assembly **102** may be mirror images (and the same could be true of the wearpads **202**, **204** respectively on the top and bottom of the boom assembly **102** in some embodiments). Advantageously, by placing the wearpads **202**, **204** at the corners of the boom assembly, a substantial portion of the force distributed to the second boom **106** may be distributed to the vertical side walls **120** rather than the bottom plate **122** and top plate **124**. Thus, it is contemplated that the bottom plate **122** and/or the top plate **124** may use a lighter, cheaper material, and/or the boom assembly may be capable of handling larger loads without change boom materials.

FIGS. **5-6** are illustrations showing a side view of an outer boom **104**, an inner boom **106**, and a wearpad **202** located therebetween. As shown in FIG. **5**, the chamfered portion **206** of the wearpad **202** may include an angled top surface **234** (i.e., facing the inner boom **106**). In other embodiments, such as the embodiment shown in FIG. **6** the bottom surface **236** (i.e., facing the outer boom **104**) may be angled at the chamfered portion **206**. It is also contemplated that both of the surfaces may be angled at the chamfered portion **206**. All of these embodiments are associated with the advantage of reducing the maximum stress experienced when the inner boom **106** is extended and experiences a load.

FIGS. **7A-7B** are illustrations showing perspective views of a rear section and a front section of the boom assembly **102** having a first set of wearpads **236** located between the first boom **104** and the second boom **106** and a second set of wearpads **238** located between the second boom **106** and the third boom **108**. As shown, certain wearpads **236**, **238** may have different cross-sections to create additional space adjacent to a boom. For example, referring to FIG. **7**, the wearpads **236** located on the top side of the boom assembly **102** between the first boom **104** and the second boom **106** have a relatively thin base portion (i.e., the portion oriented horizontally in FIGS. **7A-7B**) such that the first boom **104** and the second boom **106** are relatively close on the top side of the boom assembly **102**. Wearpads **238** with similar dimensions are located between the second boom **106** and the third boom **108** on the bottom side of the boom assembly **102**.

In contrast, the wearpads **236'** between the first boom **104** and the second boom **106** on the bottom side of the boom assembly **102** have a base portion with a thick cross section, thus providing a larger space **240** between the first boom **104** and the second boom **106** on the bottom side of the boom assembly **102**. This may be advantageous for providing space for wires, sensors, hydraulic equipment, and the like. Wearpads **238'** with similar dimensions are located between the second boom **106** and the third boom **108** on the top side of the boom assembly **102**. When a wearpad **236'**, **238'** has a base with a relatively large thickness, the thickness of the base portion may be at least about 1.5 times as large as the side portion, such as about 2 times as large, or even about 3 times as large (or larger) than the side portion.

While not shown, it is also contemplated that certain wearpads may have side portions with different dimensions to provide additional space between respective boom sidewalls. This may occur instead, or in addition to, the spaces provided as shown in FIGS. **7A-7B**.

FIGS. **8A-E** are illustrations showing various views of a housing arrangement **302** for the wearpad **202**. The housing arrangement **302** may be used for wearpads installed on an inner corner **126** of a boom **106**, as shown. To constrain the wearpad **202** along the length of the boom **106**, a fixed member **304** may contact a first end **242** of the wearpad **202** inside the opening **128** of the boom **106**. At the end **130** of the boom **106**, a removable plate **306** may be positioned to contact the second end **244** of the wearpad **202** such that the wearpad **202** cannot slide out of the opening **128**. As shown in FIG. **8C**, the profile of the removable plate **306** may be sized and positioned such that it remains clear of the first surface **208** and the third surface **212** (which are configured to contact an inner boom). The remaining degrees of freedom of the wearpad **202** may be constrained by the inner and outer booms themselves once the wearpad **202** is installed. In some embodiments, the wearpad **202** may define an opening **246** (here extending from the first surface **208** to the second surface **210**) to receive a fastener (e.g., a screw, clip, clamp, etc.), which may be advantageous for providing temporary constraint prior to the booms being properly positioned to fully constrain the wearpad **202**. The fastener may fix the plate **306** with respect to a surface of an extension **310** (or other surface) of the boom **106**.

To optimize installation and removal time, the removable plate **306** may be released/installed through respective removal/deployment of only one fastener **312** (e.g., a bolt, clamp, pin, etc.). However, to enhance securement of the plate **306** with respect to the boom **106**, the plate **306** may include a tab **314** that is associated with a slot **316** formed in the boom **106**. Thus, when installing the plate, a user can insert the tab **314** within the slot **316** and then tighten the fastener **312** to efficiently and quickly secure the wearpad **202** in place. The slot **316** may constrain the tab **314** in at least two directions even before tightening the fastener **312**. While not shown, it is contemplated that the tab **314** and slot

316 may be switched around (i.e., the slot **316** may be included in the plate **306**, and the tab **314** may be included with the boom **106**).

FIGS. **9**A-B are illustrations showing various views of another embodiment of a housing arrangement **402** for the wearpad **202**. This embodiment may be particularly suitable for a wearpad **202** having a relatively thick base portion (as described in more detail above). As shown, the housing arrangement may include a bracket or plate **406** with a first portion **418** for constraining a first end **242** of the wearpad **202**, a second portion **420** for constraining the second end **244** of the wearpad **202**, and a middle portion **422** extending from the first portion **418** to the second portion **420** (and the middle portion **422** may optionally constrain the wearpad **202** along its length).

The first portion **418** of the plate **406** may be fixed to an extension having an opening (or "slot" for purposes of this disclosure) for receiving a pin **424** (which may be considered a "tab" for purposes of this disclosure), where the pin **424** is fixed to the boom **106**. Alternatively, the pin **424** may be fixed to the extension **426** of the plate **406** and the opening may be defined by the sidewall of the boom **106**. The pin **424** and associated opening may constrain the plate **406** along the longitudinal direction of the boom **106**. Thus, one difference between this embodiment and the embodiment of FIGS. **8**A-E is that the "tab" and "slot" are located adjacent to an end of the wearpad opposite the fastener (i.e., the fastener is adjacent to the second end **244** and the "tab" and "slot" are located adjacent to the first end **242**).

Further, the second portion **420** of the plate **406** may have an opening or other element associated with the fastener **412**, which may be similar to the fastener of the plate **306** of FIGS. **8**A-E. Advantageously, the single fastener may be used to fully constrain the plate **406**, and thus also the wearpad **202**, which is advantageous for the reasons discussed above.

FIG. **10**A-E are illustrations showing various views of another embodiment of a housing arrangement **502** for the wearpad **202**, which may be used when the wearpad **202** is located on a top side of the boom **104** (or, alternatively/additionally, the bottom side). As shown, like the embodiments described above, a plate **506** may be used to constrain the wearpad **202** in the longitudinal direction of the boom **104**. However, instead of (or in addition to) a pin (as shown in FIGS. **9**A-B), constraint of the plate **506** in the longitudinal direction may be accomplished by a tab **514** and slot **516** (similar to the embodiment of FIGS. **8**A-E). Like the other embodiments, the plate **506** may be associated with a single fastener **512**.

FIGS. **11**A-D are illustrations showing various views of another embodiment of a housing arrangement **602** for a wearpad **204**. This embodiment may be particularly suited to house a wearpad **204** that is attached to an outer perimeter of the boom **106**, as shown. The housing arrangement **602** may include a fixed member **604** that constrains the first end **242** of the wearpad **204** and a plate **606** that constrains the second end **244** of the wearpad **204**. Like the other embodiments described above, the plate **606** may be associated with one fastener, and may include a tab **614** that is associated with a slot **616** through a wall of the boom **106**. However, in this embodiment, the tab **614** itself may provide the constraint of the second end **244** of the wearpad **204**. That is, the fastener **612** may be located on an opposite side of a wall **620** with respect to the wearpad **204** such that the slot extends though the wall **620** to reach a location adjacent to the wearpad **204**. Advantageously, the fastener **612** may be reached from a location inside the opening **128** of the boom **106**, which may be more easily accessible with respect to other locations, particularly when the boom **106** is an inner boom surrounded by an outer boom (not shown).

While various embodiments of the invention have been described, the invention is not to be restricted except in light of the attached claims and their equivalents. Moreover, the advantages described herein are not necessarily the only advantages of the invention and it is not necessarily expected that every embodiment of the invention will achieve all of the advantages described.

We claim:

1. A wearpad for a telescopic boom assembly, the wearpad comprising:

a first surface for contacting an outer boom of the boom assembly;

a second surface for contacting an inner boom of the boom assembly; and

a length, wherein the first surface and the second surface extend along the length, and wherein the length extends along a longitudinal direction of a boom assembly; and

a chamfered portion with a first end at a first location along the length and a second end at a second location along the length, wherein the first surface and the second surface converge along the chamfered portion, such that a first distance between the first surface and the second surface at the first end of the chamfered portion is greater than a second distance between the first surface and the second surface at the second end of the chamfered portion.

2. The wearpad of claim **1**, wherein the wearpad includes a second portion adjacent to the chamfered portion, and wherein the first surface and the second surface are parallel along the second portion.

3. The wearpad of claim **2**, wherein when the wearpad is in use, the chamfered portion is closer to an adjacent end of the outer boom.

4. The wearpad of claim **1**, wherein a distance along the length from the first end of the chamfered portion to the second end of the chamfered portion is at least 10 times greater than a chamfer displacement from the first end of the chamfered portion to the second end of the chamfered portion.

5. The wearpad of claim **1**, wherein a distance along the length from the first end of the chamfered portion to the second end of the chamfered portion is at least 50 times greater than a chamfer displacement from the first end of the chamfered portion to the second end of the chamfered portion.

6. The wearpad of claim **1**, wherein the chamfered portion includes an angled portion of the first surface.

7. The wearpad of claim **1**, wherein the chamfered portion includes an angled portion of the second surface.

8. The wearpad of claim **1**, wherein a chamfered portion angle is less than about 2 degrees.

9. The wearpad of claim **1**, wherein a distance from the first end of the chamfered portion to the second end of the chamfered portion is at least about 3 inches.

10. The wearpad of claim **1**, wherein a cross-section of the wearpad includes an L-shaped profile.

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